A TAXONOMIC STUDY ON TWO INDO-PACIFIC SPECIES OF *CANTHARUS (PRODOTIA)* [MOLLUSCA : BUCCINIDAE]

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Abstract. Populations of an Indo-Pacific buccinid species previously considered to belong to a highly variable species, have been examined and tabulated, and are now separated into the two sympatric species *Cantharus* (*Prodotia*) *iostomus* (Gray in Griffith & Pidgeon) and *C.* (*P.*) *lannumi* (Schwengel).

The tropical Indo-Pacific buccinid species *Cantharus* (*Prodotia*) *iostomus* (Gray in Griffith & Pidgeon) has been considered by this author (Cernohorsky 1971, 1985) and other authors, to be composed of highly variable individuals occurring in populations throughout the Indo-Pacific region. However, a detailed study undertaken on 168 specimens of the *"iostomus"* complex revealed the existence of two different species which were found to be sympatric in 5 Indo-Pacific localities. During the study, 119 specimens were assigned to *C.* (*P.*) *iostomus* (Gray in G. & P.) and 49 specimens to *C.* (*P.*) *lannumi* (Schwengel). The emended synonymies for the two species are given below.

Family BUCCINIDAE

Genus **Cantharus** Röding, 1798

Cantharus Röding, 1798, Mus.Bolten. p.132. Type species by SD (Cossmann, 1901) *Buccinum tranquebaricum* Gmelin, 1791. Recent, Indian Ocean.

Subgenus **Prodotia** Dall, 1924

Prodotia Dall, 1924, Proc.Biol.Soc.Washington 37:89. Type species by OD *Pisania billeheusti* Souverbie (= Petit de la Saussaye, 1853) = *Triton iostoma* Gray in Griffith & Pidgeon, 1834. Recent, Indo-Pacific.

Cantharus (Prodotia) iostomus (Gray in Griffith & Pidgeon, 1834) (Figs 1-9, 17)

1834. *Triton iostoma* Gray in Griffith & Pidgeon, Anim.Kingd.Bar.Cuvier, Moll.Radiata 12:600, pl.23,fig.4.
1846. *Buccinum marmoratum* Reeve, Conch.Icon. 3:pl.12,fig.95 (non Link, 1807; nec Anton, 1838).
1853. *Phos billeheusti* Petit de la Saussaye, J.Conchyl. 4(3): 244, pl.8,fig.5; 1856 Petit de la Saussaye, J.Conchyl. 5:42.

Figs. 1-9. *Cantharus* (*Prodotia*) *iostomus* (Gray in Griffith & Pidgeon). 1,2. Paralectotype of *Buccinum marmoratum* Reeve, B.M.(N.H.) No. 1979191; 31.4 mm. 3. Specimen from Broadhurst reef, Qld., Australia, AMS No. C-118669; 30.3 mm. 4,5. Specimens from Apia reef, W. Samoa; 29.8 mm and 22.3mm respectively. 6. Specimen from Rabaul, Papua New Guinea; 19.5 mm (intermediate form). 7. Specimen from Broadhurst reef, Qld., Australia, AMS No. C-118668; 22.0 mm (slender form). 8. Holotype of *Phos billeheusti* Petit, Mus.Nat.d'Hist.Nat.Paris; 28.0 mm. 9. Specimen from Moruroa Atoll, Tuamotu Archipelago; 22.8 mm.

TYPE LOCALITY. None (*iostomus*); Capul I, Philippines (*marmoratum*); Nouka-Hiva = Nukuhiva, Marquesas Is (*billeheusti*).

DISTRIBUTION. From East Africa to French Polynesia and the Hawaiian Islands.

Type specimens. The type of *C.* (*P.*) *iostomus* is lost, but the good illustration from Griffith & Pidgeon (1834, pl.23,fig.4; see Cernohorsky 1975, fig.59) is here designated as the illustrated lectotype. Although the embryonic whorls cannot be counted, the figure does show a slender, pointed protoconch, the whorls are centrally angulate and the presutural ramp concave, the basal constriction is lower on the body whorl and the siphonal canal is more truncated than in *C.* (*P.*) *lannumi.*

The three syntypes of *Buccinum marmoratum* Reeve, are in the British Museum (Nat.Hist.), London, No.1979191, dimensions of lectotype length 32.2 mm. Although the two largest specimens lack a protoconch, the smallest paralectotype has a protoconch of 3¼ whorls. *B.marmoratum* is twice a primary homonym and thus taxonomically unavailable (Figs.1,2).

The holotype of *Phos billeheusti* Petit de la Saussaye, is in the Muséum National d'Histoire Naturelle, Paris, length 28.0 mm, width 10.5mm, height of aperture 13.3 mm. The holotype has a decollate lavender protoconch of only three-quarters of one inrolled whorl, a feature frequently observed in mature individuals of the *Pisania-Prodotia* group of species with a multispiral protoconch (see Cernohorsky 1971, figs.31,21 and 34,35). This feature has been observed in a few specimens of *C.* (*P.*) *iostomus* but has not been encountered in *C.* (*P.*) *lannumi.* The lavender colouring, sculpture, low constriction on body whorl, wider aperture and short siphonal canal, show the species to be conspecific with *C.* (*P.*) *iostomus.* In addition, *C.* (*P.*) *lannumi* has not been recorded east of Samoa.

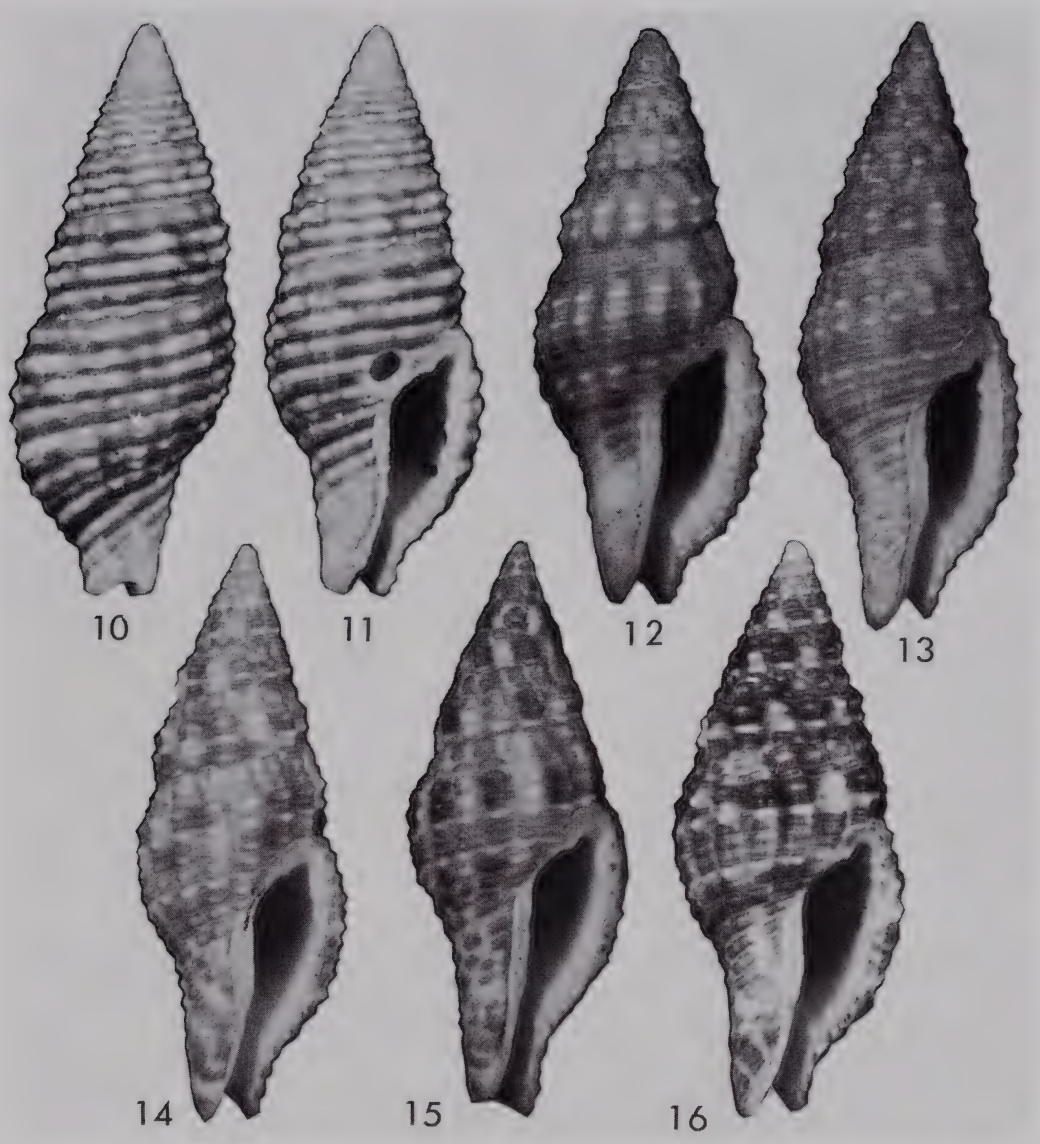
Cantharus (Prodotia) lannumi (Schwengel,1950) (Figs.10-16, 18)

1846. *Buccinum gracile* Reeve, Conch.Icon. 3:pl.12,fig.96 (non da Costa, 1778).
1864. ? *Pisania billeheusti* var.C, *P.artensis* Souverbie & Montrouzier, J.Conchyl. 12:266 (not illustrated).
1865. ? *Fusus* (*Pisania*) *crosseanus* Souverbie in Souverbie & Montrouzier, J.Conchyl. 13:160, pl.5,fig.6 (nom.subst.pro *Pisania artensis* Souverbie & Montrouzier, 1864).
1950. *Phos lannumi* Schwengel, Nautilus 63(3):80, pl.5,fig.3.

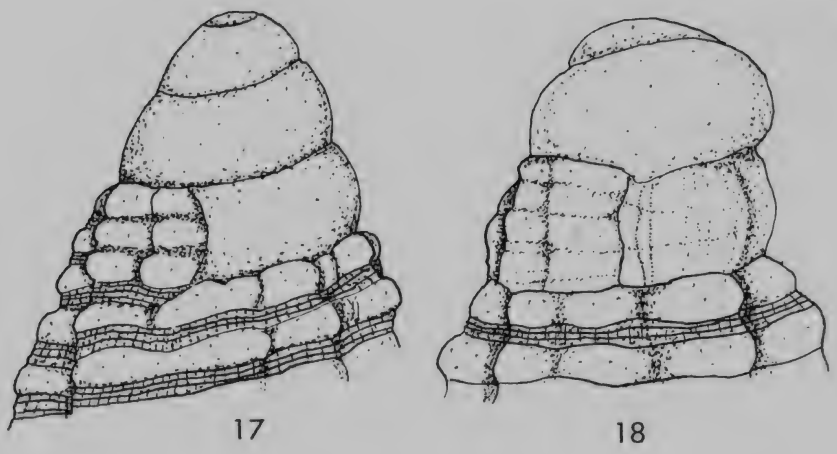
TYPE LOCALITY. Masbate I, Philippines (*gracile*); Art I, New Caledonia (*artensis* and *crosseanus*); Guam I, Marianas Is (*lannumi*).

DISTRIBUTION. From Mauritius to the Samoa Islands.

Type specimens. Three syntypes of *Buccinum gracile* Reeve, are in the British Museum (Nat.Hist.), London, No. 1979192. Two of the syntypes have 1¼ worn embryonic whorls while a young syntype has 1¼ unworn embryonic whorls. The syntype measuring length 21.3 mm, width 7.0 mm (Figs. 10,11) is here designated as the lectotype.



Figs. 10-16 *Cantharus* (*Prodotia*) *lannumi* (Schwengel). 10,11. Lectotype of *Buccinum gracile* Reeve, B.M.(N.H.) No. 1979192; 21.3 mm. 12. Holotype of *Phos lannumi* Schwengel, ANSP No. 186176; 16.7 mm. 13. Specimen from Long I, Torres Strait, N.Australia, AMS No. 77167; 26.2 mm. 14,15. Specimens from Noumea, New Caledonia. 14. AMS No. C-3962; 20.6 mm. 15. AMS No. C-4306; 24.8 mm. 16. Specimen from Apia reef, W.Samoa; 15.3 mm.



Figs. 17,18. Protoconchs. 17. *Cantharus* (*Prodotia*) *iostomus* (Gray in Griffith & Pidgeon). 18. *C.* (*P.*) *lannumi* (Schwengel).

The type specimens of *Pisania artensis* and *Fusus crosseanus* are presumably in the Bordeaux Museum, France, but are not at present available for examination (Dr. P. Bouchet, in litt.). Souverbie & Montrouzier (1864) described the shell of *C.* (*P.*) *billeheusti* (= *C.* (*P.*) *iostomus*) as being "violaceus ornamented with brown" and the protoconch as "rosaceus" without an indication of the actual number of embryonic whorls. They separated the variant *artensis* on the basis of a protoconch of only 1½ smooth, pale horny-coloured embryonic whorls, and the authors also listed differences in sculpture and shell colour. They found that both *billeheusti* (= *iostomus*) and *artensis* co-existed on Art I, New Caledonia. The description strongly indicates that *Pisania artensis* may be an earlier name for *C.* (*P.*) *lannumi.*

Souverbie & Montrouzier (1865) proposed the new name *Fusus* (*Pisania*) *crosseanus* for the description applicable in 1864 to *Pisania artensis*. This time they illustrated the species (1865, pl.5,fig.6) and the figure shows a shell similar in form to *C.* (*P.*) *lannumi.* but it is dark brown in colour with white sutural lines and small white spots and a white central line with white spots on the body whorl; being an immature individual, the denticles in the aperture have not yet been formed. Among the 49 specimens of *C.* (*P.*) *lannumi* examined, there was not a single specimen which even remotely resembled the type figure of *Fusus crosseanus* in colouring. Since the identity of the two New Caledonian taxa cannot be resolved from the description and single illustration, the species must be elucidated on the basis of their type specimens whenever these become available for examination.

The holotype of *Phos lannumi* Schwengel, is in the Academy of Natural Sciences, Philadelphia, No. 186176. Dimensions are length 16.7 mm, width 6.7 mm, height of aperture 8.6 mm; the protoconch has 2¼ cream-coloured embryonic whorls (Fig. 12).

The 119 specimens were measured and pertinent diagnostic characters recorded (Table 1). The more constant differentiating characters are as follows: About 90% of specimens of *C.* (*P.*) *iostomus* have lavender-coloured shells, or shells with a lavender or violet cast at least on the upper spire whorls, whereas 100% of specimens of *C.* (*P.*) *lannumi* have a white to cream base colour and no violet or lavender colour cast. The brown ornamentation is in the form of blotches in *C.* (*P.*) *iostomus,* and in *C.* (*P.*) *lannumi* the nodules are coloured brown or white. *C.* (*P.*) *iostomus* has a conical multispiral protoconch of 3-3½ rosy-mauve to violet or lavender embryonic whorls, with the first whorl very small (Fig.17). *C.* (*P.*) *lannumi* has a paucispiral protoconch of only 1¼-2¼ cream-coloured embryonic whorls, with the first whorl being large (Fig.18). Kay (1979) reports Hawaiian *C.* (*P.*) *iostomus* with only 2½ embryonic whorls, but all the specimens examined from Hilo, Hawaii, had a protoconch of 3-3¼ embryonic whorls. Whorls of the teleoconch tend to be centrally angulate and occasionally echinate in *C.* (*P.*) *iostomus*, whereas the sculpture is predominantly nodulose with more convex whorls in *C.* (*P.*) *lannumi.* In *C.* (*P.*) *iostomus* the penultimate whorl has from 1-6 more axial ribs than the body whorl, but in *C.* (*P.*) *lannumi* the penultimate whorl has 1-3 fewer axial ribs than the body whorl. The aperture in *C.* (*P.*) *lannumi* is narrower, the siphonal canal is more slender and constricted and the body whorl constriction is higher than in *C.* (*P.*) *iostomus.*

Table 1. Comparative shell characters of *C.* (*P.*) *iostomus* and *C.* (*P.*) *lannumi.*

Characters	*C.* (*P.*) *iostomus*	*C.* (*P.*) *lannumi*
Size	To 37.0 mm	To 26.0 mm
Width	30% - 46% of length	30% - 43% of length
Teleoconch	6-9 whorls, frequently with a lavender cast, and with brown blotches.	6-8 worls, ornamented with brown and white on nodules.
Protoconch	3-3½ rosy-mauve embry. whorls.	1¼-2¼ cream embry. whorls.
Axial ribs body whorl	9 - 22	13 - 20
Axial ribs penult whorl	10 - 23	12 - 17
Spiral cords body whorl	6-15 main spirals + intermediate ones, or up to 21 cords of equal size.	10-15 main spirals + intermediate ones, or up to 8 cords of equal size.
Denticles outer lip	6 - 12	8 - 10
Denticles on columella	4 - 8	4 - 7
Cords on fasciole	5 - 10	7 - 10

The two species were found to be sympatric in areas like Mauritius, Philippines, Nth. Australia, the Marshal Is and Western Samoa. A ready separation on the basis of the listed differentiating characters posed no problem and no intergrades were encountered.

Acknowledgements. For the loan of type specimens and other material utilized in this study I am grateful to Dr P. Bouchet, Muséum National d'Histoire Naturelle, Paris; Dr W. Ponder and Mr I. Loch, Australian Museum, Sydney; Dr R. Robertson and staff, Academy Natural Sciences, Philadelphia; Ms K. Way, British Museum (Nat.Hist.) London; Dr S. Johnson, Mid-Pacific Marine Laboratory, Enewetak Atoll, Marshall Is; Mr I. Scott, Auckland, New Zealand, and Mr J. Trondle, La Force, France.

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